

| *A United States pediatrician in Peru demonstrates a public health approach to the personal health services of a mountain village.*

A Child Health Program

in the

Mountains of Peru

By CRAIG BURNS, M.D.

THE MOUNTAINS of Peru rise quickly and sharply a few miles inland from the sea. The train from Lima must climb to 3 miles above sea level before it reaches a pass through which it can proceed to the Andean plateau and thence to the town of La Oroya, 137 miles to the east. It is the people of this area, which is in the region of Peru called the *sierra*, with whom this paper is concerned.

The Andean plateau of central Peru is above the tree line. Its elevation varies from 10,000 to 16,000 feet, with most of the people living at altitudes between 11,000 and 15,000 feet. A few eucalyptus trees, brought in after the conquest by Pizarro, grow in some of the sheltered valleys at the lower levels. The climate is temperate, with as much sunshine as in Reno, Nev. In summer, December through March, rainfall is moderately heavy, night temperatures rarely fall below freezing, and the daytime temperature is about the same indoors and out. During winter, June to September, almost no rain falls, the nights are cold and frosty, and the days are warm and sunny. Because the air is thin, it is difficult to start a fire, and water evaporates at an astounding rate.

Dr. Burns is chief physician of Chulec General Hospital, operated by the Cerro de Pasco Corp. at La Oroya, Peru.

The climate of the plateau is invigorating, and there are few insects, no reptiles, and no dangerous beasts. But it is no paradise. Syphilis and tuberculosis are major afflictions. Typhoid fever, typhus fever, rabies, and hydatid disease are endemic. From data obtained in La Oroya, it is estimated 1 of every 4 children dies before the age of 13 years.

It should be emphasized, however, that health conditions throughout Peru are improving at an ever-increasing tempo. The Peruvian Ministry of Public Health, which has responsibility for the health of all the people, is conducting campaigns against prevalent diseases. Municipalities are participating in the national health program in matters concerning sanitation of public buildings, urban hygiene, protection of food and water supplies, and sewage systems. The Servicio Cooperativo Interamericano de Salud Pública, an official Peruvian agency financed jointly by the United States and the Peruvian Governments, is engaged in almost all phases of preventive and curative medicine. Attention given to the problems of the hard-to-reach regions of the *sierra* is quite naturally less than that given to the more accessible coastal areas. As in other mountainous areas of the world, living conditions in the *sierra* do not attract volunteers in health work.

Particularly important in Peru is the advance in industrial hygiene. Since 1947, when a law made mandatory an industrial hygiene

program for miners and other industrial workers, the Department of Industrial Hygiene, with assistance from the Servicio, has conducted medical and engineering studies in many of Peru's industries. Already evident are improvements in control of dust, in sanitation, and in protective devices for workers.

Another significant factor in health is the effort, by both the government and the large industries, to improve housing. New houses under construction by one large mining company for its workers have two rooms, a stove, running water, and a flush toilet. Many families in the *sierra*, however, still live in one-room houses without inside water or sanitary facilities. In the mining towns, these houses have a stove or fireplace. In the outlying areas, the natives construct a low stone house, called a *chosa*, with a roof of straw or grass through which the smoke from cooking and heating fires seeps out. The floor of the *chosa* is dirt, and the bed is a bank of earth, a few feet above the level of the floor.

In the plateau area, the Peruvian Government operates two general hospitals for workers (but not for their families) and one tuberculosis hospital, and it has set up agencies for public health work. In addition, the Cerro de Pasco Corp., which has mining, smelting, and ranching operations throughout the *sierra*, maintains 10 hospitals and 8 dispensaries, employing 22 physicians. It provides medical care for its workers and their families, some 60,000 people in all.

My assignment in La Oroya began in late 1953. There had been little public health work in this area, and the number of children needing medical services was startling. Chulec General Hospital, a 130-bed, well-equipped hospital of the Cerro de Pasco Corp., cares for most of the town's 25,000 population and also receives patients needing specialized treatment from the other nine smaller company hospitals. The hospital employs 8 physicians and 3 interns, and it operates a separate outpatient clinic staffed by 2 Peruvian physicians. Because the patient load of these facilities was overwhelming, I found it necessary to abandon specific objectives of general practice and to concentrate on the sources of human ills—un-

hygienic practices, improper diet, and endemic diseases.

The fundamental need was for health education. One of the difficulties, however, was the lack of means of communication. About 95 percent of the population is Spanish speaking; the remainder converse only in Quechua, the old Inca language. Almost half of the population cannot read or write. An incident in March 1954 demonstrated that even colorful and attractive charts containing printed words could not be depended upon to deliver the desired message. We placed three such charts, on nutrition and diet, in the hospital waiting room, which was crowded with patients. Were they well received? Was everything clear to the patients? A quick survey disclosed that not one patient in the room understood the charts.

In attempting health education, one may begin with the adults and hope that the new information will be handed down to the young people. I believe, however, that major emphasis should be given to the health of the children. This is the story of the development of a child health program in La Oroya. It recounts experiences from December 1953 through November 1954, and it shows the progress of ideas, the work accomplished, and the changes in attitudes of all persons concerned.

The Pediatric Department

December 1, 1953: Pediatric department organized at Chulec General Hospital; children's bed capacity doubled, from 4 to 8! An average of 200 children seen daily in outpatient clinic; no time for immunizations, adequate records, or followup care. Few parents will accept routine immunizations for their children or allow them to be hospitalized.

Establishment of the pediatric department was the beginning of the concentrated effort to improve the health of the children in La Oroya. In past years, few children had been patients of the hospital, although there was much illness and many deaths among them. According to information obtained from the parents of children brought to the hospital or the clinic during the period of this report, 27 percent of their children had died before they reached the age

of 13 years (which is the age when many of the children begin to shift for themselves), but only 6 percent of these deaths had occurred in a hospital (table 1). It seemed that the people of La Oroya did not have much faith in medical care or that they did not understand that it was not necessary for so many children to die. We soon learned, however, that it was not that they were adverse to hospitals and modern medicine, but that they didn't know what to expect from them. This is illustrated by the following incident:

January 29, 1954: Parents brought in 3-month-old baby with six toes on left foot. Since local superstition about having six toes creates fear and anxiety, they wanted an operation right away—they would wait while we took off the unsightly toe so that they could take the baby home. Finally, they were persuaded to leave the baby for 4 days. Brother of baby also had six toes and had been successfully operated upon earlier.

By February, the bed capacity of the pediatric ward had been increased to 14, not counting bassinets for infants. By May there were 20 beds for children, 16 bassinets, and 2 incubators. Of necessity, the ward is run quite differently from such wards in the United States. For

lack of space, beds are close together; there is no possibility of isolation. Most of the children eat their meals at a table in the center of the room, where the older children assist the younger ones. All the children are helpful and cheerful. A few newcomers cry for the first 24 hours, but rarely do the children fight among themselves. Many are reluctant to leave the hospital.

Visiting days at the hospital, Wednesdays and Sundays, are a festival. In troop parents and relatives in colorful costumes, the women carrying babies in *mantas* on their backs and all carrying baskets of fruits and jars of jellies. They sit on the floor about the beds, orderly and quiet, but they have many questions to ask. At first, at least half of the visiting parents wanted to take their children home with them, but now we are rarely bothered with these requests.

Causes of Illness and Death

The hospital data presented in tables 2 and 3 give some idea of the causes of death and illness among the children in La Oroya. According to these data, pneumonia, diarrhea, and tuberculosis rank high as causes of both illness and death, and syphilis is a major cause of illness. Burns, often resulting from the use of kerosene

Table 1. Births and deaths of children among families interviewed in Chulec General Hospital and outpatient clinic, December 1953–November 1954

Month of interview	Number of families interviewed	Number of children born	Number of children living	Number of children dead ¹	Percent of children dead	Number of deaths in hospital	Percent of deaths in hospital
December 1953	91	419	314	105	25	7	7
January 1954	77	338	242	96	28	5	5
February	99	401	288	113	28	13	11
March	93	377	270	107	28	5	5
April	93	417	315	102	24	9	9
May	82	350	246	104	28	7	7
June	101	391	292	99	25	3	3
July	90	383	281	102	26	7	7
August	101	428	318	110	25	8	7
September	92	396	278	118	29	4	3
October	93	401	278	123	30	3	2
November	88	386	280	106	27	5	5
Total	1, 100	4, 687	3, 402	1, 285	27	75	6

¹ Under 13 years of age.



“. . . the women carrying babies in mantas on their backs”

or gasoline to start fires in this area, also are a frequent cause for admission to the hospital.

Routine chest X-rays of adults show scar tissue of healed tubercles in more than 25 percent of those examined. That the disease remains a major problem is shown by the number of patients reporting for treatment as well as by the results of tuberculin tests and X-ray surveys. In one grade school of 800 students, 34 percent had positive reactions to the Mantoux test, and 3.36 percent were found to have active pulmonary tuberculosis.

Response to treatment for tuberculosis is remarkable. Good food, a bed to sleep on, and rest produce amazing results—the antituberculosis drugs are merely a dessert. Almost every patient responds rapidly to treatment. Active pulmonary tuberculosis has been cured even with ambulatory outpatient treatment.

Syphilis is seen in many forms. Several babies with arms and legs as hard as bone have been brought into the hospital. Others have syphilitic deterioration of the nose, the lips, or the anus. X-rays of older crippled children

reveal old healed syphilitic involvement of the joints. Blindness and other eye conditions resulting from this disease are not uncommon.

Hydatid disease was diagnosed in 1.4 percent of the 437 children admitted to the hospital. In this region of Peru, there are some 200,000 sheep, one of the natural hosts of the *Echinococcus granulosa*, and a great number of dogs, one of the carriers between animals and man. We found the disease as common among town children as among those living on the sheep ranches. Usually, the cysts are in the lungs, but we have found 1 in the axilla, 2 in the liver, 2 in the abdominal cavity, and 1 in the neck. The Casoni skin test is always positive in the presence of these infestations. Not one child has died from surgical removal of the cyst or cysts.

Each month there are a few patients with typhoid fever in the hospital, although there is never an epidemic. The Cerro de Pasco Corp. filters and chlorinates its water supplies, but there is no chemical or sanitary protection for the people living outside the larger towns. The rural women wash clothes in the same streams that carry sewage, and during a few months of the year, there are many flies.

Native Customs and Health

June 28, 1954: Conference today with 50 union leaders representing the workers in the mines and smelters of the Cerro de Pasco Corp. They believed that climate, lack of money to spend on imported foods, and insufficient medical services were the three main causes of infant and child mortality. Demonstrations and discussion seemed to convince them that these were not the real causes.

The appeal to these 50 slightly antagonistic fathers with union responsibilities began with the presentation of two charts. One compared the low death rates of infants and children in the United States with the very high rates in the La Oroya area. The second showed the estimated average number of days a year a child in the United States is ill and the comparable figure for their children. Especially emphasized was the negative influence of illness on the growth of children. When asked to give what

Table 2. Major causes for admission of children to the Chulec General Hospital, December 1953–November 1954

Cause for admission ¹	Number admitted	Percent of total ²
Pneumonia.....	70	16.0
Diarrhea.....	65	15.0
Syphilis.....	36	8.2
Tuberculosis.....	22	5.0
Burns.....	22	5.0
Kidney.....	17	3.9
Typhoid fever.....	15	3.4
Cardiac.....	8	1.9
Other, including parasites and surgery.....	182	41.6

¹ Only one diagnosis (reason for admission) considered here.

² A total of 437 children admitted during period.

they thought were the reasons for the differences shown in the charts, the union leaders expressed the opinions previously mentioned.

If these were the true reasons, we stated, then the children of all ages should be affected about the same. But this was not so. A chart (fig. 1) showed them that a large percentage of the deaths among children occurred before the age of 2 years. Here was a problem—what causes so many children to die during the first 2 years of life? We believe that the lack of iron-containing foods in the diet of young children—a majority of the children are anemic before they reach the age of 2 years (fig. 2)—and the use of *fajas* are contributing significantly to this

situation. We proceeded to try to convince the union leaders of the importance of these factors.

The men laughed when shown a picture of themselves at night—a man and a woman lying on a bed with a child between them breast-feeding throughout the night. We explained that allowing the child to breast-feed all night (a practice that may continue until the child is 2 to 4 years old) spoils his appetite for health-giving foods in the daytime. A child needs iron, and there is practically no iron in milk. To illustrate the last point, we used the following demonstration:

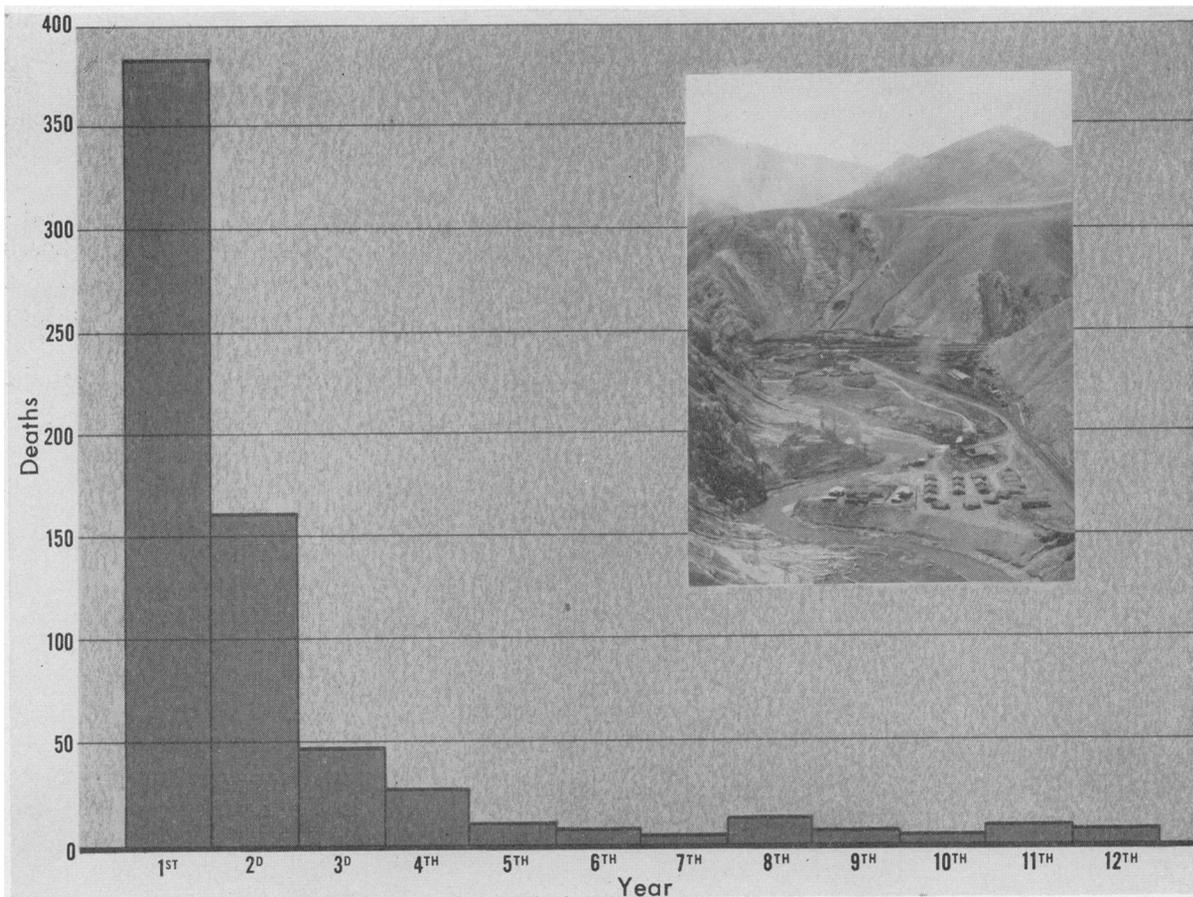
Two 2-liter beakers were placed on the table, along with a 1½-liter bottle of basic fuchsin solution (which is the color of blood), and a quart bottle of milk. The first beaker was filled one-third full of fuchsin solution, to represent the amount of blood in a newborn baby. The second beaker was filled almost full with the fuchsin solution, to represent the amount of blood in a 1-year-old child. During the first year of life, the baby's body has to make the quantity of blood shown by the difference in the amount of liquid in the two beakers. If the baby gets only milk (containing no iron), the blood looks like this—and the quart of milk was emptied into the first beaker, bringing the level of the liquid up to the level in the second beaker. What a difference in color! The blood fortified with milk was a sickly pink shade.

By now the men began to appear interested. Appetite for iron-containing foods, as well as other nutritional foods, we continued, is also

Table 3. Causes of death among children under 13 years of age in Chulec General Hospital, December 1953–November 1954

Age	Cause of death					
	Pneumonia	Diarrhea	Tuberculous meningitis	Tuberculosis	Other causes	Unknown
0-6 months.....	3	0	1	1	2	0
6-12 months.....	1	4	1	0	0	0
1 year.....	3	3	0	1	2	1
2 years.....	1	0	1	0	0	0
3 years.....	1	0	1	1	0	0
4 years.....	0	0	0	0	1	0
6 years.....	0	0	0	0	0	0
11 years.....	0	0	1	0	1	0
Total.....	9	7	5	3	6	1

Figure 1. Age at death for 675 children of the Peruvian sierra, according to information obtained from their parents.



dulled as a result of the practice of adding sugar to all liquid given a child—1 to 3 teaspoonfuls to every cup of water or milk or coffee. Sugar does not contain iron, and we demonstrated this point as follows:

Sugar, like wood, burns and gives energy, with only ashes left—no minerals, no iron to form blood. Had they ever obtained iron by burning wood? A stick of wood was produced and burned—the men smiled when the ashes were passed around for their inspection. Did they know that sugar would burn too? A volunteer was called for, a man smoking a cigarette. A pile of sugar was placed on a plate on the table. Cigarette ashes were mixed with the sugar, the ashes representing the chemicals in the body. Then the sugar was ignited with a match, and the men saw that it burned like wood. They could find no iron in the ashes.

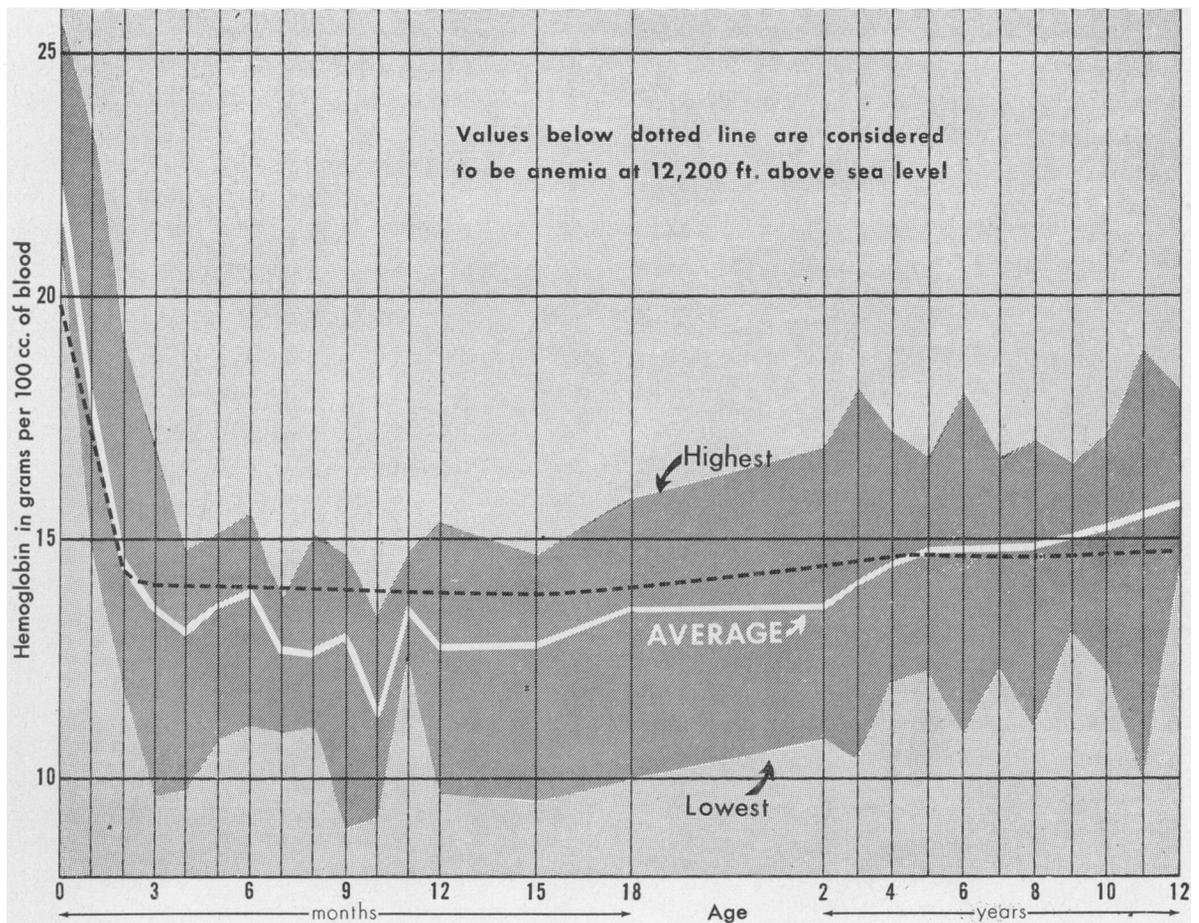
After these demonstrations, we emphasized

that there were plenty of iron-containing foods available locally, but that they were not being used. We urged the men to send their wives to the clinic so that we could instruct them in proper diet for children.

Next, the subject of *fajas* was discussed. *Faja* is the name of the woven cotton or wool band which is wrapped around a baby from the time he is born until he is 2 or 3 years old. Three *fajas* are usually used. One is placed next to the skin around the chest. The second is wrapped around the body and arms at the level of the elbows to keep the baby from using his arms to climb out of the *manta* in which he is carried on his mother's back. The third *faja* is placed at the level of the knees to keep the baby's legs quiet.

When asked about the *fajas*, every woman gives the same answer: If the baby does not begin life with the *fajas*, *se recalca*. But get-

Figure 2. Hemoglobin values for 365 children tested in La Oroya, December 1953–November 1954.



ting to the meaning of *se recalca* is another matter. It means that the ribs will not stay where they should. It means that the baby will have stomach pains. It means that the baby will have "much cough" when he grows up and that he must then be held upside down and shaken so that the bones will go to the proper places. But the *fajas*, we attempted to explain, prevent full expansion of the lungs and hinder blood circulation and normal body movements in the rapidly growing baby, and thus they may contribute to many of the ills and deformities of the population. We have seen deformed ribs and concave thoraxes produced by this constriction.

Child Health Clinics

May 31, 1954: *The first child health clinic was held in La Oroya today, from 3 to 4 p. m.*

Number of patients was overwhelming. Managed to see 14 mothers with 18 children. Gave 17 injections of DTP vaccine; instructed the mothers on diet and cleanliness; and distributed fifteen 1-cc. dropper bottles of ferrous sulfate solution.

The need for a children's clinic in La Oroya had been recognized early, and plans for the operation were under way by April. The clinic was envisaged as a means not only of providing medical care but of increasing the efforts to prevent illness. Hence, immunizations against such diseases as whooping cough, diphtheria, smallpox, and typhoid fever, as well as education in matters of diet, cleanliness, and the like, have been as important a part of the clinic program as the treatment of ill children.

At the conference with the union leaders previously mentioned, the final subject of discussion

was immunizations. A show of hands revealed that 13 of the men present were unable to sleep well the night before because of coughing children. We guaranteed them that if they saw to it that their workers brought their children to the clinic for whooping cough immunizations, there would be no epidemic of that disease the next year.

Originally scheduled for 2 hours a week, the clinic was soon being held 10 hours a week. Always, there were more patients than could be seen in the allotted time. By August, although most of the mothers still brought their children because of cough, fever, or diarrhea, a few were coming only to receive the immunizations.

School Health Program

August 26, 1954: Our first visit to a school—76 students aged 4 through 12 years. Set up table and chairs in the playground and administered smallpox and DTP vaccine to each child. Placed inkmark on child's right hand to show that he had received the immunizations—his badge of bravery.

This visit represented another major step in the child health program, for it was the beginning of our school health activities. Two more visits were made to this school to complete the DTP immunizations, and during these visits many of the children's mothers appeared in the schoolyard and asked us to vaccinate their children who were too young to attend school. One mother even brought a small dog, figuring that what was good enough for her baby was good enough for her puppy.

On September 8, 1954, we held our first conference on health with the teachers of one of the larger schools in the town (800 students). The teachers unanimously agreed that nutrition was the major health problem, and we discussed a powdered-milk program as a first step in meeting it. (The powdered-milk program finally got under way in mid-1955.) We also presented a filmstrip lecture on how disease is transmitted, and the following week we gave the same lecture to each class as an introduction to a typhoid immunization program. Subsequently, the typhoid immunization pro-

gram was carried out, with full cooperation from both students and teachers. Interest ran particularly high because one schoolboy, the son of one of the teachers, became ill with typhoid fever 2 days before the program was begun.

In November, BCG immunizations were begun. The vaccine is made in Lima and furnished free by the Peruvian Government, which also supplies free the typhoid, DTP (from UNICEF), and smallpox vaccines. Every baby born in the hospital and every schoolchild who reacts negatively to the tuberculin skin test now receive the BCG vaccine.

Recent Developments

A review of the child health clinics after the first 6 months of operation indicated that we were not making the best possible use of our time. The following changes have been made in recent months:

1. A Peruvian physician specializing in pediatrics sees all children brought into the outpatient clinic in La Oroya. He has a staff of three auxiliary nurses trained in pediatrics (Peruvian women who have received training at Chulec General Hospital), who interview each mother and give her instructions as to diet, cleanliness, and when to return to the clinic.
2. Every child brought to the outpatient clinic is given DTP and typhoid immunizations.
3. A child health nurse has been employed to supervise the child health program in the clinics, the schools, and the outlying areas.
4. A visual education program has been started in each of the schools to teach the importance of cleanliness and immunizations.
5. A well-baby clinic has been established.
6. Every mother delivering a baby at Chulec General Hospital is given a course of instruction in infant care while she is in the hospital.

Summary and Conclusions

In line with the increasing efforts to improve health conditions throughout Peru, an intensive child health program was begun in La Oroya in December 1953. The first action was

the establishment of a pediatric department at the Chulec General Hospital. Within the next year, child health clinics were started and a school health program was initiated. These latter activities, with their emphasis on immunizations and health education, were directed toward the prevention of illness, rather than its treatment.

The tempo of progress in the betterment of health in Peru has been accelerating rapidly during the past 5 years. This can be attributed largely to the following factors:

1. Efforts of the Peruvian Government and assistance from the bilateral programs of the United States and from international health agencies.
2. Change for the better in the attitude of foreign companies toward their workers.
3. The antibiotics. (It would be almost im-

possible to attempt a program against syphilis without penicillin, for example.)

4. The provision of better housing by both the Government and the foreign corporations.

My work in La Oroya for the past 2 years leads me to the conclusion that the following items are among those most needed for further advancement:

1. Better equipped schools and more years of instruction—to raise the level of general education, as well as health education, and to make it possible for more Peruvians to meet the requirements for advanced education so that the supply of trained local people can be increased.
2. A 300-bed tuberculosis hospital to serve the people of the central Andean plateau.
3. Improvement of the public roads.
4. Incorporation of a utilizable form of iron in canned milk to help combat anemia.

Vending Stands for the Blind

A report from the Office of Vocational Rehabilitation issued at the end of October 1955 showed that 1,721 blind vending stand operators (602 on Federal property) were employed in 1954 as against 1,659 during 1953, the previous high. Operators and their employees (310 blind and 746 sighted assistants) earned \$5.3 million in the year ending June 30, 1955, an increase of \$500,000 over the preceding year. The net earnings of the operators totaled approximately \$4 million and those of the assistants, \$1.3 million.

An act initially passed in 1936 provided for the establishment of vending stands in federally owned or leased buildings. Amendments in 1954 authorized the establishment of such stands on other property, such as national parks and grounds of Federal buildings. They require each Federal agency in control of property to issue regulations designed to assure preference for blind persons in the operation of vending stands on that property.

The great majority of the blind persons employed in the vending stand program have been trained through the State-Federal vocational rehabilitation program. Only about 8 percent of the estimated 320,000 blind persons in the United States are employed although experience has indicated that about 25 percent of those disabled by blindness can be trained for gainful employment.